CEREAL SCIENCE today

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FEB 18 1958

AN OFFICIAL PUBLICATION
OF THE
AMERICAN ASSOCIATION
OF CEREAL CHEMISTS

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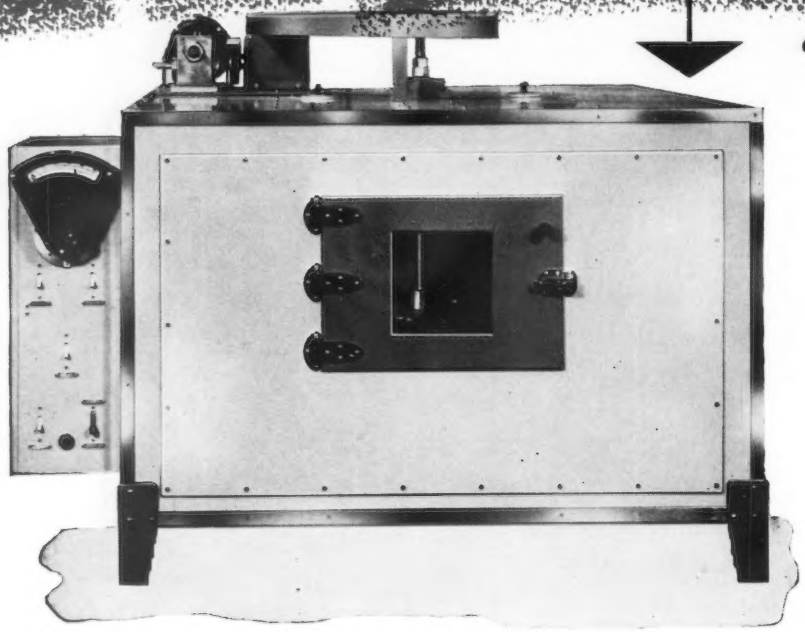

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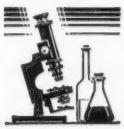
The Vital Story of Vitamin B_1

(Thiamine)

by Science Writer

History. The discovery of vitamin B_1 resulted from research into the cause of beriberi. Almost 50 years passed between Eijkman's discovery of the relationship of the disease to diet and the famous work of Jansen and Donath who first isolated the crystalline vitamin from rice bran.

Within ten years of that first isolation the vitamin's chemical structure was determined and it was successfully synthesized.



Eijkman's work resulted in the development of a theory that beriberi was caused by a lack of some factor in the diet and not by a toxin or infectious agent. This idea was not readily accepted until the growth of dietary knowledge proved it correct.

Isolation and Synthesis. In 1926 Profs. Jansen and Donath accomplished the isolation of crystalline vitamin B_1 from rice bran. In 1931 Windaus and co-workers successfully isolated pure vitamin B_1 and established its empirical formula. In 1936 R. R. Williams, and independently R. Grewe, explained the vitamin's chemical structure. That year, R. R. Williams and J. K. Cline accomplished the synthesis of thiamine which is in wide use today. Andersag and Westphal also synthesized the vitamin in 1936. Another synthesis was described by Bergel and Todd in 1937.

Photomicrograph of B_1 crystals

Chemical and Physical Properties. Thiamine hydrochloride is white, water soluble, with a nut-like, salty taste and yeast-like odor. Its empirical formula is: $C_{12}H_{17}ClN_4OS \cdot HCl$. Thiamine produced by synthesis is identical chemically and in biological activity with that obtained in pure form from nature.

Deficiencies. A deficiency of thiamine is characterized by these symptoms: depression, irritability, fearfulness, lack of initiative and interest, loss of appetite. Symptoms vary since in usual practice deficiencies of other water-soluble vitamins occur. Medical treatment is simple: a sufficient amount of thiamine is administered to relieve symptoms quickly and the physician provides for a continuing adequate intake.

Beriberi victim

A severe deficiency of thiamine leads to beriberi, a serious and sometimes fatal disease. While beriberi is almost a medical curiosity in the United States, it is common in countries in which polished white rice is a staple of the diet.

Human Nutrition Requirements. Thiamine is one of the nutritive elements the human body needs daily and does not store in quantity. The minimum daily requirements established by the U. S. Food and Drug Administration for the prevention of symptoms of thiamine deficiency disease are:

Adults	1.00 mg.	Children (1-5 incl.)	0.50 mg.
Infants	0.25 mg.	Children (6-11 incl.)	0.75 mg.

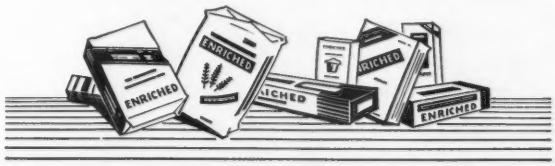
The Food and Nutrition Board of the National Research Council recommends the following dietary intake of thiamine for healthy persons in the U. S. A.

Recommended Daily Intake in Milligrams

Age	*Men*	*Women*
25	1.6	1.2
45	1.5	1.1
65	1.3	1.0
Pregnant (3rd trimester)		1.5
Lactating		1.5

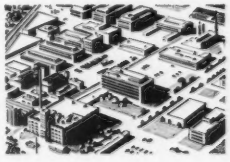
The Council recommendations for infants and children vary below and above these figures, based on age and sex. Various illnesses and stress situations can exhaust vital reserves of thiamine. So, for the physician, vitamin B_1 is prepared in various dosage forms and potencies for therapeutic and prophylatic use.

How do human beings receive thiamine? It is widely distributed in foods of animal and vegetable origin, particularly cereal grains and dry legumes. Because of public demand for refined products which millers must meet for obvious economic reasons, a loss of thiamine and other factors occurs during processing. The thiamine loss is overcome through the use of *enrichment* in cereal grain products for which Federal Standards exist, or in other foods such as breakfast cereals, by *fortification* or *restoration*. When enriching, fortifying or restoring, the food processor adds the necessary amount of pure thiamine (and other vitamins and minerals) to the food so that the finished product meets Federal, state and territorial requirements or contributes to the consumer an amount of the vitamin which dietary experts believe significantly useful.



Thiamine is extensively used for the enrichment of cereal grain foods such as white flour, white bread and rolls, macaroni products, farina, corn grits and meal, milled white rice. The story of these uses is delightfully told in a separate brochure which is available on request for reference or educational purposes.

Production. Huge production facilities at the Hoffmann-La Roche plant in Nutley, New Jersey, deliver highest quality thiamine *by the tons*. Roche manufactures thiamine hydrochloride and thiamine mononitrate. These fine products, which equal or exceed U.S.P. specifications, are ideal for use by pharmaceutical makers and food processors. Years of experience in research and manufacture have made Roche the leader in vitamins.



This article is published in the interests of pharmaceutical manufacturers, and of food processors who make their good foods better with essential, health-giving vitamin B_1. Reprints of this and others in the series are available on request. Write the Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 1956 Bourdon Street, St. Laurent, P. Q.

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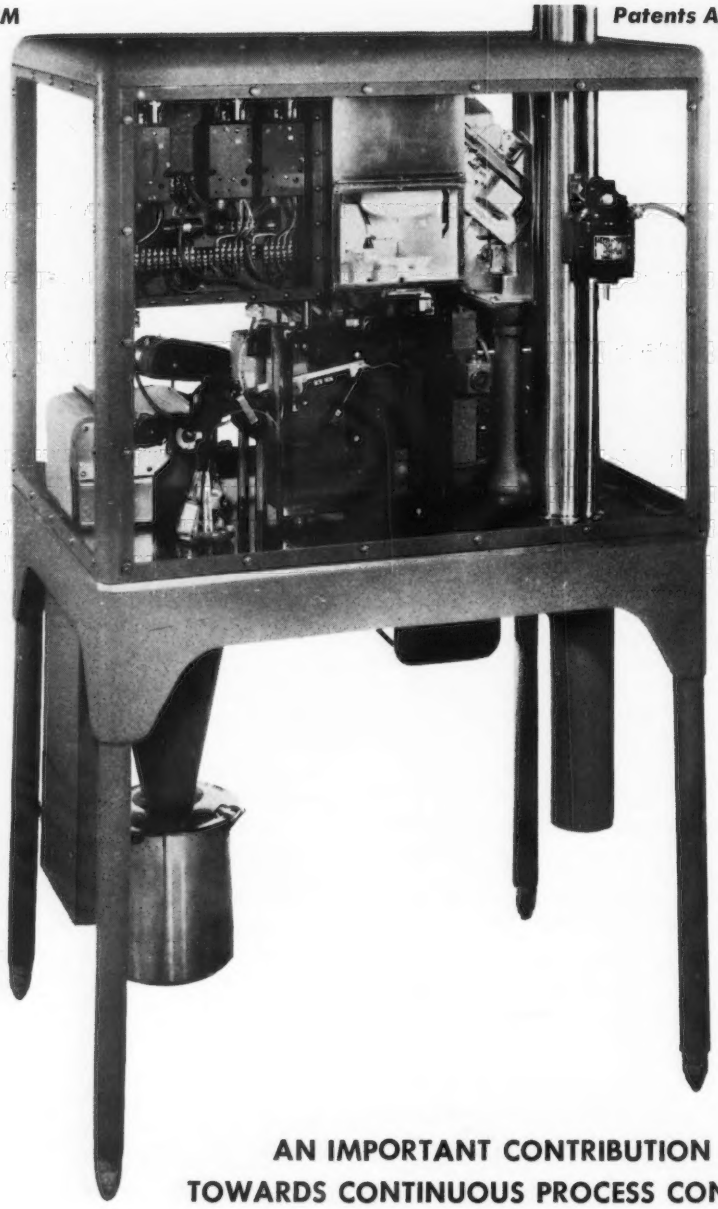

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COVER: Roller mill floor of Meyerhans & Cie. Ltd., Weinfelden, Switzerland. This soft-wheat and semolina mill grinds 70 tons of grain daily. Original construction dates back to 1782. (Photo courtesy of Buhler Bros., Switzerland.)

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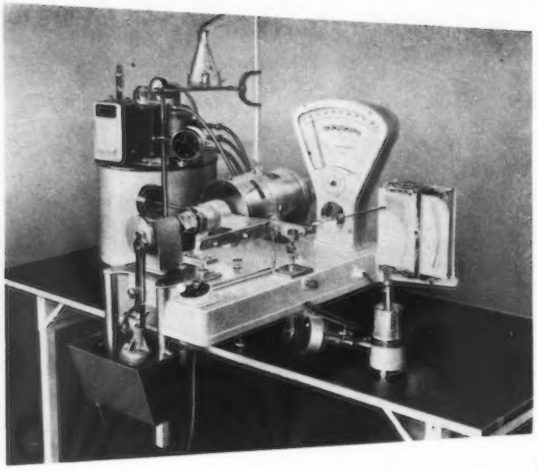

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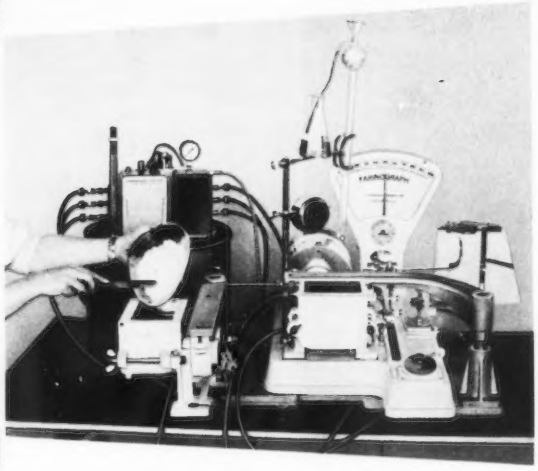

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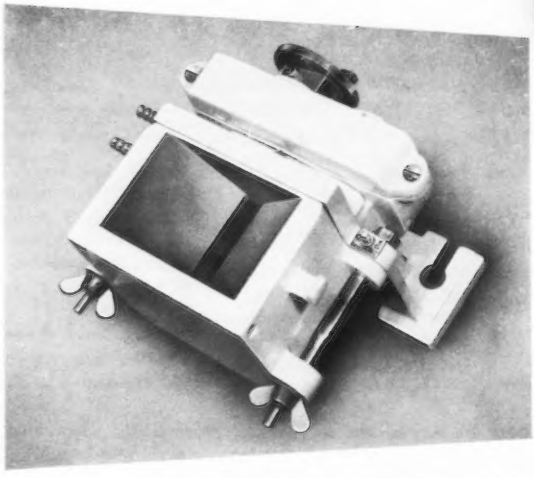

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Editorial

In this issue of CST we initiate two series of informative features designed to (1) acquaint our readers with the several other organizations which contribute to the technical advancement of the cereal processing industries; and (2) to bring to the attention of the A.A.C.C. membership the various responsibilities and duties assumed by the elective officers and to emphasize the size and complexity of such assignments.

On page 26, Dr. John T. Goodwin, Jr. of the Corn Industries Research Foundation, Inc., discusses the role of the Foundation in relationship to the corn wet milling industry and describes its various functions. Many similar foundations, institutes, laboratories and committees make sizable technical contributions to our science. Some concern themselves with the broad aspects such as nutrition, agriculture, etc., while others confine their interest to a specific cereal or kind of processing. Later articles in this series will describe the history, objectives, and mode of operation of these organizations.

Members of the A.A.C.C. will be particularly interested in the "President's Corner" on p. 40 where D. B. Pratt, Jr., our National Treasurer, describes his duties and responsibilities. As the A.A.C.C. has grown from approximately 11 members to over 1200, the depth and scope of its activities has kept pace. Its publications have an international circulation and its Monograph Series and book of analytical methods are standard reference volumes. Such extended services to our members and others in the cereal field require a sound administrative organization with each officer having defined duties. In future columns, the President, President-Elect and Secretary each will add their story. We believe that when the series is concluded with a job description of our headquarters staff, every member will be cognizant of the problems existing in administering a professional society of our size.

Paul E. Ramstad

PURPOSES AND PROGRAMS OF

Corn Industries Research Foundation

By John T. Goodwin, Jr., Technical Director, Corn Industries Research Foundation, Inc., Washington, D.C.

THE CORN REFINING industry of the United States is served by the research and information organization known as Corn Industries Research Foundation, Inc., with headquarters in Washington, D. C.

There are eleven companies in the United States which manufacture corn starch, dextrose, corn syrup, corn oil, feedstuffs, and similar by-products from corn by the wet-milling process. All eleven are corporate members of the Foundation, giving it 100 per cent industry representation.

Basic Purpose

As its primary mission, the Foundation copes with those industrywide problems which are most appropriately handled through group effort. Its aim is to do everything possible, with propriety and within legal limitations, to improve the economy of the corn refining industry — in the realization that resultant benefits will accrue to the farmer, the consumer, and all who come within the industry's scope.

These activities are financed by dues from the eleven member firms, each company contributing in proportion to the size of its annual grind. Dues are assessed and collected by an outside agency, so that the size of grind of the individual companies is not disclosed.

CIRF Organization

A board of eleven trustees, consisting of a top executive from each member company, governs the Foundation. The trustees establish policies, approve the annual budget, and otherwise direct operations. Current president is W. T. Brady, president of Corn Products Refining Company.

Floyd J. Hosking, executive vice-president, heads the Foundation's salaried staff of 16 full-time and part-time employees. Legal and public-relations services, working with staff personnel, serve the several industry committees charged with carrying out operational programs.

Floyd J. Hosking

Research Program

Although it operates no laboratories and owns no scientific apparatus, the Foundation's research program can be credited with much of the progress in basic carbohydrate research during the past two decades. Research fellowships (together with related administrative activity) amounting to some $2,200,000 have been awarded since 1935. Through 67 fellowships and grants sponsored at 40 scientific institutions, including most of the leading universities, some government agencies, and nonprofit research institutes, 255 technical papers have thus far been contributed to the scientific literature.

More than the scientific work itself —which has contributed to a number of important technological breakthroughs leading to increased consumption of corn — several hundred graduate and undergraduate students have been assisted in their scientific education.

The program includes the annual Starch Round Table, a conference of the nation's foremost carbohydrate scientists.

For outstanding public services, the Foundation's research program won a 1957 Grand Award of the American Society of Association Executives.

The research program is supervised by the Technical Advisory Committee, made up of leading research executives from member companies. Staff officer John T. Goodwin, Jr., technical director of the Foundation, works with TAC.

John T. Goodwin, Jr.

Technical Services

The cooperative effort of industry companies to maintain and enlarge domestic and foreign markets for industry products is centered in the Technical Service Committee. This group, like TAC, is made up of specialists from member firms.

One of TSC's primary tasks is to supply government officials with technical data required to solve regulatory questions. Its work involves close liaison with food and feed officials at all governmental levels and with all agencies interested in specifications for food and industrial items containing products from corn.

Much of the work of TSC and other Foundation committees is directed toward developing and improving food standards. To this end, TSC likewise undertakes research projects which are applied or practical in nature. Staff services are supervised by William J. Hoover, CIRF manager of technical services.

William J. Hoover

Plant Management

New information on plant operations and manufacturing processes, on innovations in equipment design and improvements in safety engineering and plant-sanitation methods, is developed and disseminated through the Foundation's Plant Management Committee.

This committee provides a focal point at which plant managers can exchange experiences and points of view for the common benefit of the industry. Its work covers a wide range of interests: pest control, industrial wastes, corn sanitation, prevention of boxcar damage, corrosion problems, vacuum cleaning, design of new machinery, and the like.

New industry booklet is discussed at CIRF conference in office of the Foundation's Executive Vice President, Floyd J. Hosking, seated at head of table.

Other Activities

Staff personnel, in collaboration with the industry's Transportation Committee, seek 1) to define the collective point of view of the corn refiners on freight-rate changes and 2) to present such conclusions to the appropriate regulatory bodies, with the aim of eliminating geographical inconsistencies in commodity rates.

From the editorial and publications offices (3 East 45th St., New York 17), news material and booklets are sent out to familiarize the public with the corn refining industry and its products. Technical and semitechnical literature describing various products and their uses, as well as educational material in more popularized form, is available on request.

An economic and statistical library relating to the industry, its raw materials, products, and markets is maintained at the Washington headquarters. Staff work here involves a two-way interpretation effort: on the one hand, the Foundation functions as official representative of the corn refining industry to federal, state, and semipublic agencies; on the other, it serves as the medium whereby government plans, decisions, regulations, and similar official actions are relayed to personnel of member companies.

Service and More Service

If any one word can be said to summarize the objectives of Corn Industries Research Foundation, it is *service*.

On behalf of the industry it represents, the Foundation invites inquiries from the food and nonfood industries of America concerning possible ways in which assistance can be provided toward developing products of higher quality and toward a stronger national economy.

Headquarters of Corn Industries Research Foundation, Inc., is located on the ninth floor of this office building in Washington, D.C., seen from the park in historic Farragut Square.

FROM PRIMITIVE TO MODERN

Breadmaking in the Land of the Bible

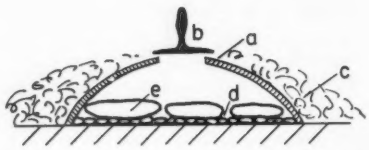
By L. Adler, Food Department, Israel Ministry of Trade and Industry, Haifa, Israel

ONLY WITHIN THE past century, or less time, has the bakery trade been established in Israel. In older times people in towns prepared bread at home and brought their molded loaves to a public oven to be baked, for payment. In villages, every family had its own oven. These customs have not yet disappeared, and in many families of Oriental origin breadmaking is still the housewife's obligation.

Today, however, the Oriental type of bread no longer represents an essential part of bread production. European types of bread are common, not only in towns but also in small settlements. Owing to the quick development of the country and to the variety of countries from which people have immigrated to Israel, no uniformity has developed, either regarding the quality of bread or the methods of production, bakery equipment, and the like.

In traveling through the country one may see, in Arab villages, what appear to be small huts built of clay, with low entrance doors. At first glance one may mistake them for stables. During the morning hours, however, smoke may be observed rising — not from a chimney, but through small holes and clefts in the walls of the "hut." The smoke is issuing into the open air and enveloping the structure. The "hut" is, one finds, an oven called a "tarboon," being heated and prepared for bread-baking. This is the oven of the "fellahin" or settled peasants. It consists of a cupola of burnt clay, about 3 feet in diameter, with a hole on the top which can be closed with a lid. The floor of the interior, or hearth, is covered with a layer of pebbles for better conservation of heat. The fire surrounds the cupola and is made of any fuel available — wood, olive-oil cake,

Tarboon near Nazareth



Cross-section of tarboon: a, cupola wall; b, lid of cupola; c, ash and cinders; d, pebbles; e, bread.

or anything convenient that will burn. When the fire has burned down, ashes and cinders are heaped up around the outside to keep the heat in, and the oven is then ready for baking.

During the previous evening a soft dough has been prepared and left to rest overnight. Usually a piece of old dough is used as ferment, but nowadays compressed yeast is being used more and more. After the dough is fermented, it is divided and quickly shaped by hand into round, flat loaves, which are immediately put into the oven with no further proofing. Without the use of any tool, the oven is loaded several times through the hole at the top, each batch consisting of six to eight loaves. Bread of the first batch, being exposed to flash heat, is sometimes burned while the inside of the loaf is still insufficiently baked. The bread in any case has a thin, soft crust, indented on the bottom from the pebbles on which it rested while baking.

Bedouin and Iraqi Breadmaking

This system of bread-baking is not suitable for the Bedouin, whose nomadic life forces him to use a more mobile baking tool — a curved iron plate called "sadj," which is placed on stones. While a fire is burning below, the soft dough is mixed and spread immediately over the plate. When one side is done, the bread is turned and baked on the other side. The sadj is used not only by Bedouins but also by Kurdish Jews, and it is assumed that the latter have brought it to Israel.

Bedouin woman in Galilee, baking bread on sadj.

"Ash tanour" is the bread of people coming from Iraq. It is similar in appearance to that baked on the sadj, although the baking process is quite different. The oven is similar to the tarboon — a cupola built of clay, about three feet high and the same in diameter. There is a fire hole near the bottom and a loading hole about a

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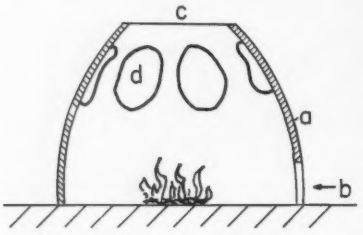
foot in diameter at the top. A small fire is maintained on the hearth. The worker spreads the soft dough over a pad made of floursacks, to which a short handle is fixed. He puts this through the upper hole into the oven and sticks the dough against the inside of the arched cupola wall, where



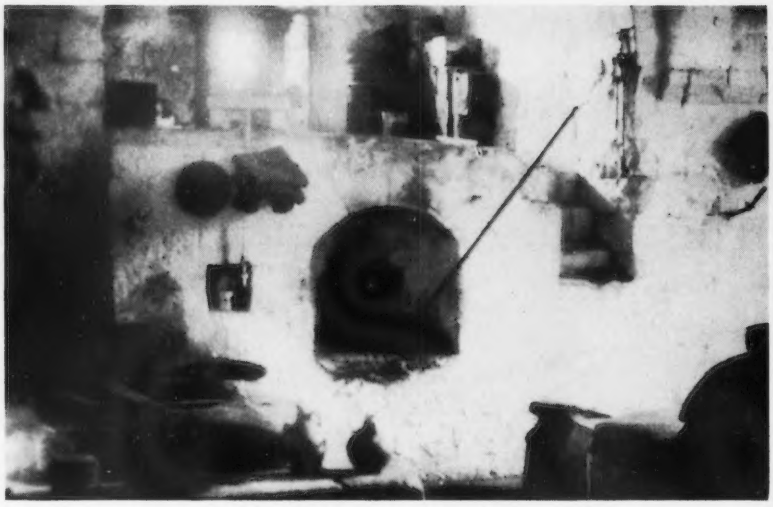
Cross-section of ash tanour oven: a, cupola wall; b, fire hole; c, lading hole; d, bread attached to wall.

it bakes while adhering to the wall. As the bread is very thin — only about a fourth of an inch thick — it is done in less than a minute. It is then torn from the wall and taken out with large paddlelike implements called tongues. By the time the loading is finished the first loaf is already done; it is removed and replaced by another sheet of dough.

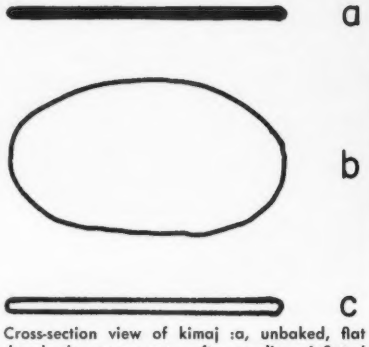
Oriental Bread

The most common type of Oriental bread baked in towns is the "kimaj." It is a round disk about as thick as a finger, having an internal split into two layers. Sandwiches are often made with it, by cutting one side to expose the open space and filling this with any kind of food such as meat, vegetables, and the like. To make this bread, a stiff dough is prepared and fermented by yeast. It is then divided and rounded by hand, flattened with a rolling pin, arranged on a peel after a short proof, and baked for about one minute. The oven is made of brick and is similar to a Dutch oven, but with a high arch. With the fire burning on one side of the hearth, bread is continuously put in on peels and removed on the other side. When put into the oven the dough immediately becomes inflated; after a short time it drops again and is as flat as before, but the loaf is somewhat higher and the inside is now split into the two layers already mentioned (see the cross-section diagram).

It may be seen, then, that even



Kimaj baking in the old city of jaffa.



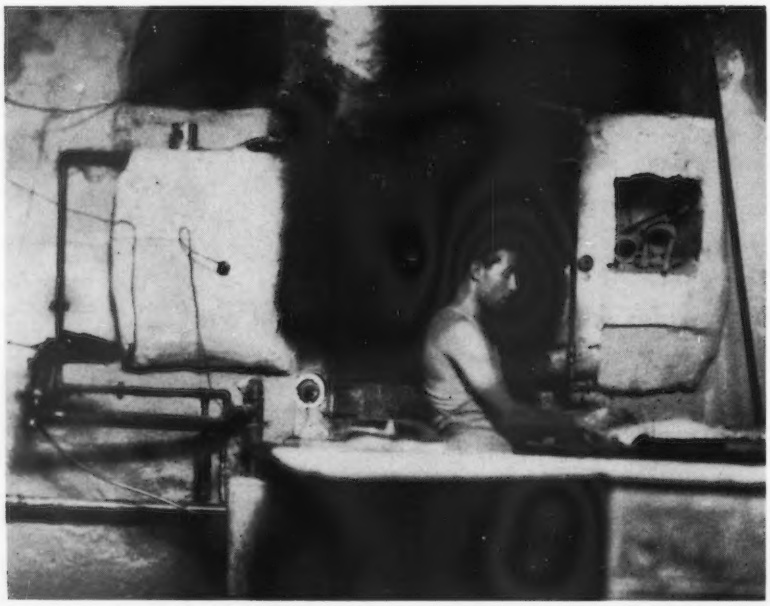
Cross-section view of kimaj :a, unbaked, flat dough; b, appearance after peeling, inflated dough; c, appearance of bread when baked.

Oriental bread is by no means uniform in shape, taste, and other properties, but is distinguished from European bread by its flat form. This shape has not developed incidentally or by preference, but is due to the quality of wheat grown in the Middle East. Most of this wheat is *Triticum durum*, a hard, glassy wheat without the usual desirable baking properties. Only flat bread can be baked from durum, and all endeavors by newcomers to bake bread from it suitable for the European taste have been in vain. Today durum is used almost entirely for the production of macaroni and very little for baking purposes. Through agricultural research, however, wheat with good baking qualities, easily grown in our climate, has been introduced.

European Breads in Israel

When considering European bread, the standard bread must first be mentioned. This is a type of brown bread prepared from wheat flour of 86 to 87% extraction, fermented by sour, with some yeast added. It is baked on the hearth in 2-pound loaves, round

View of a bakery in Jerusalem taken in 1947.



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American traveling-tray ovens in a Ha:fa bakery.

or oblong. White bread baked from flour of 75% extraction is available in various forms such as pan bread, pullman loaves, French and Vienna bread, and in different, although fixed, weights. Generally it contains no other ingredients than yeast, salt, and oxidizing and rope-inhibiting chemicals. The traditional Sabbath bread and rolls called Haloth are baked with varying additions of sugar, oil, and sometimes malt. Many bakers are also producing a more or less dark special bread, selling it under various names such as whole wheat, caraway, and pumpernickel.

Bakery Development

Bakeries where European bread is produced have reached a reasonable standard, although development, naturally, is still in various stages. There are no more bakeries where dough is mixed by hand. Mentioning this specifically may sound strange to American ears, but it must be remembered that mechanical development started very late in Israel. Fifteen years ago, mixing by hand was not unusual. Today, however, in many bakeries there may be found, besides mixers of all types, dividers, rounders, molders, flour-handling equipment, and all the usual auxiliary machinery, now being produced in this country. All types of ovens can be seen, from the old direct-heated brick oven to the modern traveling-tray or the 100-foot net-band oven, both now produced in Israel.

One problem which yet remains to be solved is the task of raising social and hygienic standards in the Oriental bakery. Conditions have remained poor in this sector of the community, and further time and effort will be needed to achieve the hoped-for improvement.

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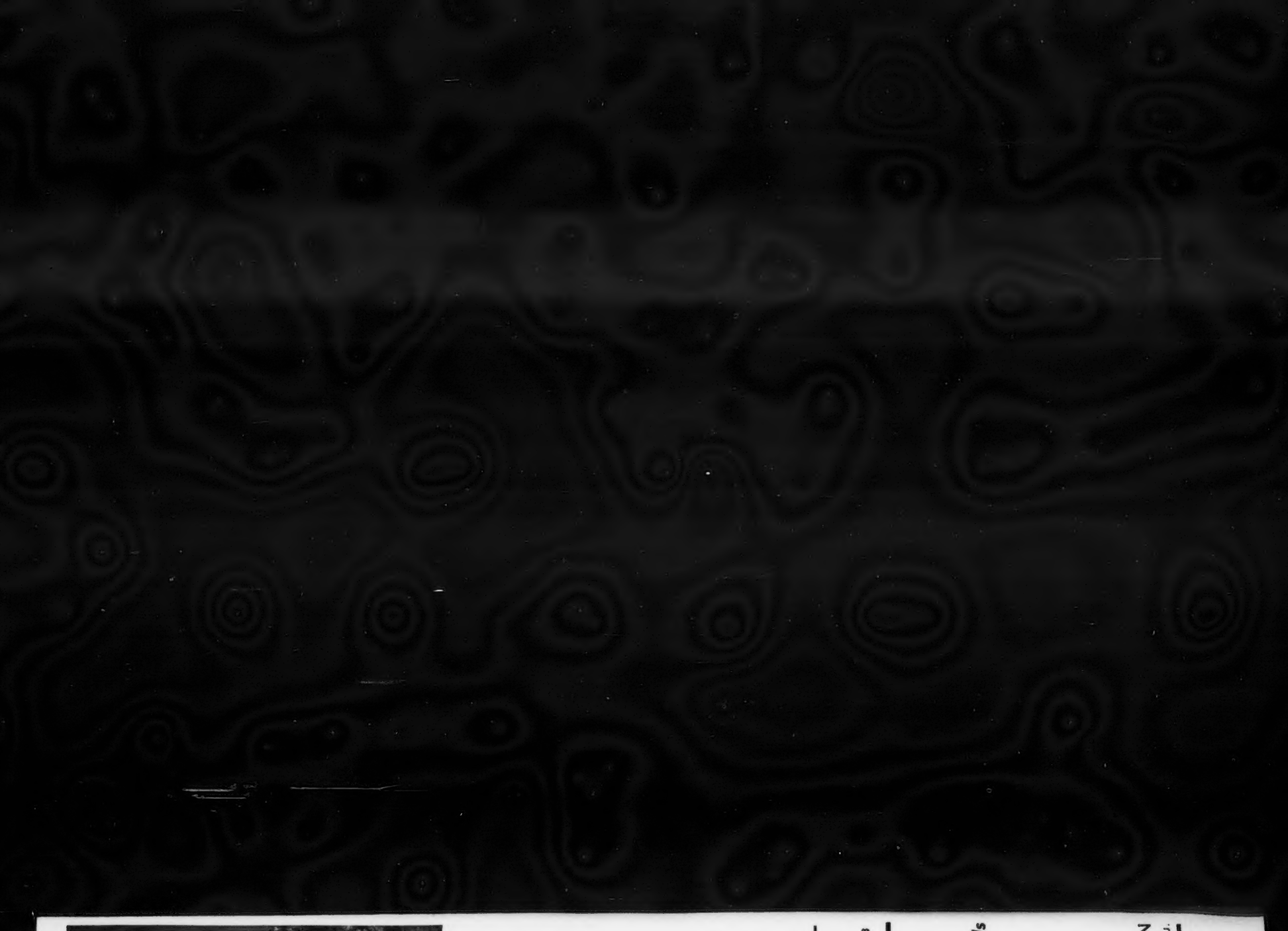

PRELIMINARY PROGRAM

43rd

ANNUAL MEETING

☆ ☆ ☆

AMERICAN ASSOCIATION OF CEREAL CHEMISTS

April 7-11, 1958

NETHERLAND-HILTON HOTEL • CINCINNATI, OHIO

GENERAL PROGRAM

Monday, April 7

Registration
2:00 p.m.

Editorial Board Meeting
1:00 p.m.

Board of Directors Meeting
2:00 p.m.

Technical Policy Committee Meeting
5:00 p.m.

President's Reception
7:00 p.m. Restaurant Continental

Tuesday, April 8

Registration
8:00 a.m.

Exhibits
9:00 a.m.

Opening Session
9:30 a.m. Hall of Mirrors

Technical Session
1:30 p.m. Hall of Mirrors

Briar Hop
7:00 p.m. Hartwell Country Club

Wednesday, April 9

Registration
8:00 a.m.

Exhibits
9:00 a.m.

Annual Business Meeting
11:00 a.m. Hall of Mirrors

Technical Sessions
9:00 a.m. Hall of Mirrors
1:30 p.m. Hall of Mirrors

Thursday, April 10

Registration
9:00 a.m.

Exhibits
9:00 a.m.

Technical Sessions
9:00 a.m. Hall of Mirrors
1:30 p.m. Hall of Mirrors

National and Section Officers Luncheon
12:15 p.m.

Cocktail Party
6:00 p.m.

Banquet and Dance
7:00 p.m. Pavilion Caprice

Friday, April 11

Registration
9:00 a.m.

Exhibits
9:00 a.m.

Technical Sessions
9:30 a.m. Hall of Mirrors
1:30 p.m. Hall of Mirrors

Board of Directors Luncheon
12:15 p.m.

Guest Speakers

FUTURE OF THE WHEAT MILLING INDUSTRY

JOHN P. SNYDER, Vice-president
in charge of production,
Pillsbury Mills, Inc.,
Minneapolis, Minn.

FUTURE OF THE CORN WET-MILLING INDUSTRY

R. G. RUARK, Vice-president,
Corn Products Refining Co.,
New York, N. Y.

REPORT OF THE COMMISSION ON INCREASED INDUSTRIAL USE OF AGRICULTURAL PRODUCTS

J. LEROY WELSH, President,
Butler-Welsh Grain Co.,
Omaha, Nebraska

LADIES' PROGRAM

Monday, April 7

2:00 p.m. Hospitality Room opens — Julep Room
7:00 p.m. President's Reception — Restaurant Continental

Tuesday, April 8

9:00 a.m. Hospitality — Julep Room
9:00 a.m. Continental Breakfast (courtesy Cincinnati Section) and Get-Acquainted Period
10:45 a.m. Tour to Krohn Conservatory
12:15 p.m. Luncheon (courtesy Sterwin Chemicals, Inc.) and Tour to Cincinnati Art Museum
7:00 p.m. Briar Hop — Hartwell Country Club

Wednesday, April 9

9:00 a.m. Hospitality — Julep Room
9:00 a.m. Bus Trip to Lexington, Kentucky
11:30 a.m. Luncheon (courtesy Wallace & Tiernan, Inc.) — Campbell House, Lexington
1:00 p.m. Bus Tour to Lexington Horse Farm Area
4:00 p.m. Return to Cincinnati

Thursday, April 10

9:00 a.m. Hospitality — Julep Room
9:00 a.m. Continental Breakfast (courtesy Cincinnati Section) — Julep Room
12:00 noon Luncheon (courtesy Merck & Co., Inc.) — Cincinnati Club
6:00 p.m. Cocktail Party
7:00 p.m. Banquet and Dance — Pavilion Caprice

Friday, April 11

9:00 a.m. Hospitality — Julep Room
9:45 a.m. Tour of Processing Plant, The Kroger Co.
12:15 p.m. Luncheon (courtesy The Kroger Co.) — Terrace Plaza Hotel

TECHNICAL PROGRAM PAPERS

Chemistry and Technology of Flour

Mineral Composition of Gluten, Starch, and Water-Soluble Fractions of Wheat Flour and Its Relationship to to Flour Quality
ROBERT K. BEQUETTE, BYRON S. MILLER, JOHN A. JOHNSON, and WILLIAM G. SCHRENK, Kansas State College, Manhattan, Kansas

Some Observations on the Constitution of Wheat Flour Lipids Isolated from Unbleached and Chlorine Dioxide-Treated Flours
K. A. GILLES, C. A. ANKER, D. H. WHEELER, and J. S. ANDREWS, General Mills, Inc., Minneapolis, Minnesota

Studies on the Importance of Starch and Protein Systems of Individual Flours in Loaf-Volume Production
J. W. PENCE, KATHRYN M. EREMIA, T. M. LUBISICH, and D. K. MECHAM, Western Utilization Research and Development Division, U. S. Department of Agriculture, Albany, California

Proportionality between Structural Relaxation Constants and Bromate Effect in Dough
I. HLYNKA and R. R. MATSUO, Grain Research Laboratory, Board of Grain Commissioners, Winnipeg 2, Canada

Content and Reactivity of Sulfhydryl Groups in Wheat Flours and Doughs
H. S. SOKOL, D. K. MECHAM, and J. W. PENCE, Western Utilization Research and Development Division, U. S. Department of Agriculture, Albany, Calfiornia

Distribution of the Sulfhydryl Group in Wheat Flour
H. MATSUMOTO and I. HLYNKA, Grain Research Laboratory, Board of Grain Commissioners, Winnipeg 2, Canada

Effects of Sulfhydryl-Blocking Reagents on the Mixing Characteristics of Doughs
D. K. MECHAM and SHIRLEY A. STRUBLE, Western Utilization Research and Development Division, U. S. Department of Agriculture, Albany, California

The Relation of the State of Oxidation of a Flour to Its Fermentation Tolerance
PAUL J. MATTERN and R. M. SANDSTEDT, University of Nebraska, Lincoln, Nebraska

Preparation and Properties of Hydroxyethylated Cereal Flours
J. C. RANKIN, C. L. MEHLTRETTER, and F. R. SENTI, Northern Utilization Research and Development Division, U. S. Department of Agriculture, Peoria, Illinois

Chemistry and Technology of Starches

High-Amylose Corn
HERBERT H. KRAMER, Purdue University, Lafayette, Indiana

Effect of Granule Pretreatment on the Intrinsic Viscosity of Amylose in Aqueous Extracts of Corn and Wheat Starches
EDNA M. MONTGOMERY and F. R. SENTI, Northern Utilization Research and Development Division, U. S. Department of Agriculture, Peoria, Illinois

Determination of Starch Paste Fluidities
W. R. FETZER, Clinton Corn Processing Company (a division of Standard Brands, Inc.), Clinton, Iowa

Effect of Drying Conditions on the Suitability of Artificially Dried Corn for Use in Starch Production
MAJEL M. MACMASTERS and MARGARET HOLZAPFEL, Northern Utilization Research and Development Division, U. S. Department of Agriculture, Peoria, Illinois; J. H. RAMSER and G. H. DUNCAN, Illinois Agricultural Experiment Station

Microstructures in Starch Granules
ROY L. WHISTLER, Purdue University, Lafayette, Indiana

Swelling and Solubility Patterns of Various Starches
HARRY W. LEACH, L. DALE MCCOWEN, and T. J. SCHOCH, Corn Products Refining Company, Argo, Illinois

Properties of Pregelatinized Starches
LOUIS A. WOLLERMANN and EDWARD W. MAKSTELL, American Maize-Products Company, Roby, Indiana

Baking and Bakery Products

Studies on the Brew Process of Bread Manufacture: The Effect of Sugar and Other Nutrients on Baking Quality and Yeast Properties
J. W. LEE and W. F. GEDDES, University of Minnesota, St. Paul, Minnesota

Gums and Some Hydrophilic Colloids as Bread Additives
E. G. BAYFIELD ET AL., The Florida State University, Tallahassee, Florida

Factors Influencing Development of Bread Flavor Precursors in Yeast-Fermented Media
JULIUS DAVIS and SAMUEL MATZ, Quartermaster Food & Container Institute for the Armed Forces, Chicago, Illinois

Staling Studies of Bread Made with Flour Fractions. V. Effect of a Heat-Stable Amylase and a Swelling-Resistant Starch
W. G. BECHTEL, American Institute of Baking, Chicago, Illinois

The Bread Staling Problem. X-ray Diffraction Studies on Breads Containing a Swelling-Resistant Starch and a Heat-Stable Amylase
H. F. ZOBEL and F. R. SENTI, Northern Utilization Research and Development Division, U. S. Department of Agriculture, Peoria, Illinois

Relation of the Rigidity of Flour, Starch, and Gluten Gels to Bread Staling
J. E. CLUSKEY, N. W. TAYLOR, and F. R. SENTI, Northern Utilization Research and Development Division, U. S. Department of Agriculture, Peoria, Illinois

Moisture Content and Relative Humidity of Bread and Its Components, Wheat Starch and Gluten, in Relation to Staling
N. W. TAYLOR, J. E. CLUSKEY, and F. R. SENTI, Northern Utilization Research and Development Division, U. S. Department of Agriculture, Peoria, Illinois

Microphotographic Studies of Doughs and Baked Goods
E. HANSSEN and H. BAHLSENS, Keksfabrik K.-G., Hannover, Germany

The Importance of the Quality of Flour Fractions in Determining Cake Quality
DOYLE H. DONELSON and JACK T. WILSON, Soft Wheat Quality Laboratory, Ohio Agricultural Experiment Station, Wooster, Ohio

Development of the Leavening System for an Instant Bread Mix
JASON MILLER, CHARLES MCWILLIAMS, and SAMUEL MATZ, Quartermaster Food & Container Institute for the Armed Forces, Chicago, Illinois

Effect of Heat on Batters. I. Photographic Studies
EILEEN BRADY and R. C. A. BRADSHAW, Quaker Oats Company, Barrington, Illinois

Wheat and Wheat Gluten

Continuous Batter Process for Separating Gluten from Wheat Flour
R. A. ANDERSON, V. F. PFEIFER, and E. B. LANCASTER, Northern Utilization Research and Development Division, U. S. Department of Agriculture, Peoria, Illinois

Vital Wheat Gluten by Drum Drying. I. Effect of Processing Variables
V. F. PFEIFER, CHARLES VOJNOVICH, and R. A. ANDERSON, Northern Utilization Research and Development Division, U. S. Department of Agriculture, Peoria, Illinois

The Relationship Between Water Penetration and Internal Cracking in Tempered Wheat Grains
GORDON GROSH and MAX MILNER, Kansas State College, Manhattan, Kansas

Treatment of Wheat with Ionizing Radiations. IV. Oxidative, Physical, and Biochemical Changes
SING-PING LAI, K. F. FINNEY, and MAX MILNER, Kansas State College and Hard Winter Wheat Quality Laboratory, Crops Research Division, A. R. S., U. S. Department of Agriculture, Manhattan, Kansas

Grain Storage Studies. XXVII. Identification of Reducing Sugars, Glycerol, and Inositol in Wheat Stored under Nitrogen
ROBERT L. GLASS, University of Minnesota, St. Paul, Minnesota

General Cereal Science and Technology

A Nuclear Method for Nitrogen Determination
J. TITTMAN, Schlumberger Well Surveying Corporation, Ridgefield, Connecticut

Nuclear Magnetic Resonance Analysis and Research as Applied to Cereal Products
H. RUBIN, Schlumberger Well Surveying Corporation, Ridgefield, Connecticut

Carotenoid Content of the Grain from Yellow Endosperm-Type Sorghums
C. W. BLESSIN, C. H. VAN ETTEN, and RICHARD WIEBE, Northern Utilization Research and Development Division, U. S. Department of Agriculture, Peoria, Illinois

Quality Control of Color Uniformity
E. HASCHKA, J. THORNBY, and G. WITTMER, Pillsbury Mills, Inc., Minneapolis, Minnesota

Protection of Food Products from Oxidative Deterioration by Means of Glucose Oxidase
R. R. BARTON and L. A. UNDERKOFLER, Takamine Laboratories, Clifton, New Jersey

Chemical Leavening Agents. I. Performance Testing in Dough Media
R. P. LANGGUTH, J. R. PARKS, A. R. HANDLEMAN, and R. E. SCHERER, Monsanto Chemical Company, St. Louis, Missouri

Chemical Leavening Agents. II. A Simple Dissolution Test for Measuring Reaction Rates of Sodium Acid Pyrophosphate
T. P. KICHLINE, A. D. GOTT, J. W. CARLSON, and R. W. WATSON, Monsanto Chemical Company, St. Louis, Missouri

Chemical Leavening Agents. III. A Simple Dissolution Test for Evaluating the Delayed Reaction of Anhydrous Monocalcium Phosphate
N. C. NIELSEN, J. F. CONN, and C. F. CALLIS, Monsanto Chemical Company, St. Louis, Missouri

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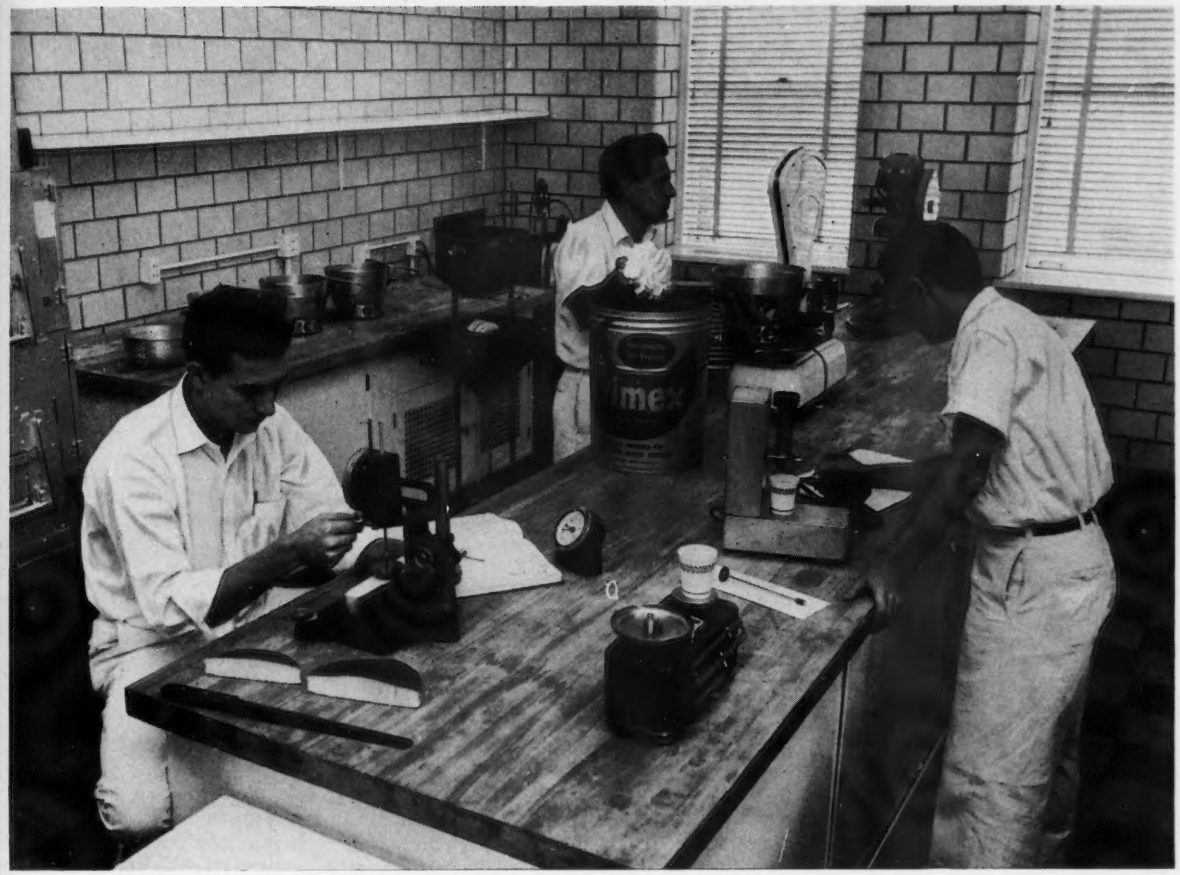

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CINCINNATI IN '58

YOU-ALL COME . . . to Cincinnati for the 1958 A.A.C.C. National Convention, to be held April 7-11 at the Netherland-Hilton Hotel.

The Cincinnati Section is celebrating its 25th anniversary, and it promises us a significant convention. J. W. Evans of the American Maize Products Company, Program Committee Chairman, and Ralph Lakamp of the Kroger Company, Local Arrangements Chairman, have planned an outstanding technical and social program.

Here are some of the places to see when *you-all* do come to Cincinnati, the Queen City on the banks of the Ohio. To keep your directions straight, remember that all streets running in a general north-south direction begin at the river, and the address numbers for those streets begin there. Vine Street is the dividing line for the east-west streets.

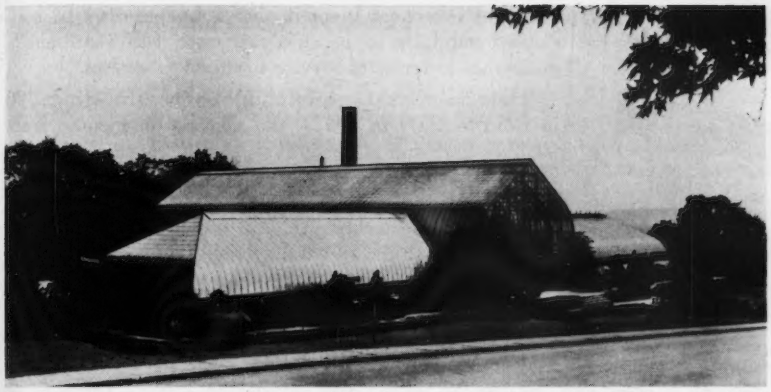
Your wife may want to do some shopping, as wives usually do, and Fountain Square is the heart of the shopping district. The square was originally granted to the city as a market place. To hold title to the land, each year the city manager buys a flower from a member of a women's civic club.

Taft Museum is on Pike Street, just off Fifth, and was built over 135 years ago. It was formerly the home of William Howard Taft, 27th President of the United States. The Museum is particularly noted for its collection of Chinese porcelain.

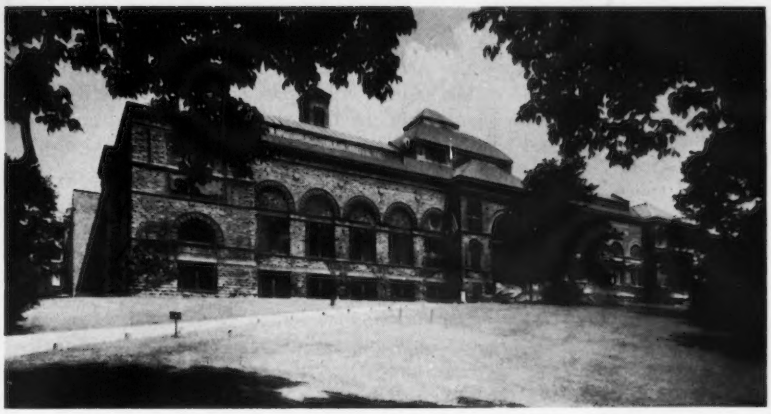
On Central Parkway and Walnut Street is the Cincinnati Museum of Natural History, with exhibits of minerals, plants, and wildlife of the Ohio Valley. In the same building is the Industrial Museum, which can be visited by appointment. It houses working scale models of all sorts of machinery, with full-size coaches of the days before the railroad and the automobile. Cincinnati's first fire alarm is here, too . . . a huge drum, as tall as a man.

The Irwin M. Krohn Conservatory is in Eden Park, and is a giant glass building covering 22,000 square feet. It has a large collection of rare tropical plants; many are in full bloom at Easter. As our convention begins the day after Easter, this exhibit will be held over for our enjoyment.

The Taft Museum was formerly the home of President William Howard Taft. Of Federal architecture, it is over 135 years old.



The Krohn Conservatory's special Easter exhibit of rare tropical plants will be held over for AACC members to view.



A visit to the Cincinnati Art Museum in Eden Park is on the schedule for AACC wives.

University, operated by the Jesuit order.

The five days of the convention will give you professional information and personal relaxation . . . plan now to visit Cincinnati in April.

Places you'll want to see in Cincinnati (reading counterclockwise): suspension bridge to northern Kentucky; Wilson Auditorium at the University of Cincinnati; Tyler-Davidson Fountain; Union Terminal; and the Elsinore entrance to Eden Park.

Also in Eden Park is the big stone and brick Art Museum, with two floors of exhibition space and a library of several thousand books on art. It has a large collection of paintings, but its specialty is sculpture. A.A.C.C. wives will lunch here on one day of the convention.

Another luncheon for the wives will be at the Campbell House in Lexington, in the beautiful Blue Grass country of Kentucky, just a short drive from Cincinnati. Calumet and other famous horse farms will be visited that day.

The 56-acre campus of the University of Cincinnati is in Clifton. Since 1906 the University has been a leader in the field of "cooperative education." In this plan the students are paired off; while one student attends classes, the other gets practical experience in a plant or office. They switch assignments periodically, generally alternating about two months of class work with two months of practical training.

Also in Cincinnati are Hebrew Union College, the oldest Jewish theological school in America, and Xavier

the President's Corner

news of the association

The Treasurer's Function

To a great many people, the title of "treasurer" brings to mind a sort of Scrooge character: a miserly individual who carefully fondles each incoming farthing, nurtures it lovingly, and parts with it grudgingly and regretfully only after much deliberation. In actuality this miserly character does exist today, to an extent, in the office of treasurer; however, this is only one of the many roles that such an officer must play in carrying out the duties of his position.

Our constitution defines the duties of the treasurer thus: "He shall collect all fees and moneys due the Association, and pay all bills by check, and shall record all receipts and expenditures . . . he shall also keep the membership roster of the Association." This is a short, simple assignment of function that presents no great problems — Utopia if I ever saw it!

Growth of the AACC and changing economic times have dictated the assumption of a far different "modus operandi." The treasurer today must be well versed in crystal-ball techniques, for much of his work centers in planning ahead.

During the past seven and a half years, the job of treasurer has been an interesting and at times frustrating one. By an evolutionary process, recognizing survival of the fittest and the fact that chemists are not "fit" when it comes to accounting, the bookkeeping operations of the Association have been streamlined, with professional assistance, and transferred to the staff at our business office in St. Paul. The membership roster has also been turned over to the business office, but the treasurer still receives, acknowledges, and processes applications for membership.

In the matter of handling funds, the business office prepares quarterly reports of income and expenses which are submitted to the treasurer for study and, if necessary, audit. All expenses of the Association are paid by check. These are signed by the treasurer and president-elect and are accompanied by memorandum invoices explaining the expenditures which are subject to review and approval by the treasurer. So much for the routine functions.

In keeping with sound business practices, officers and members of the executive committee felt that the Association should operate on a budget basis. Each year the treasurer must, with the assistance of the business manager, forecast income and expenses for the coming year and work these up into a budget for presentation to the Board of Directors. Items in such a budget must be considered carefully to be sure that each will represent a maximum in terms of service to the membership.

While membership growth has been healthy (from 790 in 1950 to 1100 in 1957), the increase in income from memberships and subscriptions to our journals has not kept pace with increases in our cost of doing business. Costs for paper, printing charges, salaries, etc., have all advanced at a faster pace than income. Increased services to the membership through the monograph series, revision of *Cereal Lab Methods*, and annual membership directories are costly undertakings. The expenses involved in such activities must be forecast well in advance so that they may be met promptly when they occur.

It has become a part of the treasurer's function to bring to the attention of the Board of Directors our future needs through forward planning, and to recommend a course of action that will ensure a solvent operation. In 1950 the dollar handle (dollar income plus dollars paid out) of the Association was approximately $40,000.00: 1957 dollar handle will approach $100,000.00. This certainly emphasizes the importance of budgeted operations and advance planning.

Future needs are never predictable in their entirety, so the Association should and does have a small reserve in the form of government securities. The treasurer is custodian of these funds. As they mature they are reinvested or converted to cash for operating needs.

The treasurer has also served as chairman of the "Fiscal Planning Committee." This group from time to time examines our financial situation and recommends changes to strengthen it. It was as a result of the work of this committee that CEREAL SCIENCE TODAY was undertaken in 1956. Such a step would bolster our income from advertising and through this contribute to our financial solidarity. At the time of launching it was anticipated that CEREAL SCIENCE TODAY would achieve a break-even point by its second birthday, and indications are that this goal will be reached. Beyond this point, financial gain will depend to a great extent on the recognition and consideration our advertisers receive from members.

Looking ahead for the next few years, our expenses will certainly increase further. We must anticipate enlarged office space, increases in staff should services to members be increased, another monograph, and increased costs for such services and supplies as we now have. Means of meeting these problems have already been presented to the officers and are presently under consideration. You will hear more of them from our President and President-Elect.

And so — what is your treasurer? An elected custodian of the funds of your association, keeper of the balm with which creditors are soothed, fireman to quench the flaming urge to spend money, crystal gazer or astrologist, spreader of gloom at directors' meetings, a Kiplinger (cereal chemist variety), greeter to new members and "dunner" to those who fall behind in their dues, author of treasurer's reports which few people read and even fewer understand, signer of checks, and eternal seeker for a means of making ends meet. It's a wonderful job, and after four full terms of office I can safely say it's been worth every minute of it — *Subject, As Always, to Action by the Auditing Committee.*

D. B. PRATT, JR.

Sanitation Workshop

At the Sanitation Methods Committee meeting held at the national AACC meeting in May 1957, it was agreed that the next step to be taken to obtain further agreement in sanitation analyses would be to hold a training school or schools for the identification of insect fragments and rodent hair. Experience with similar training sessions has shown that, to be worth while, such schools must last at least five days and must consist of both lecture and working laboratory sessions, the registration fee to be an amount sufficient to cover the cost of the meeting rooms; each individual to bring his own microscope and other equipment.

To determine how many will be interested in such a school, a questionnaire has been enclosed with the national election ballot recently mailed. The return of this questionnaire places you under no obligation, but will supply valuable information to your Committee concerning your wishes or opinions regarding the sanitation school. If you are interested in attending, please fill out and return the questionnaire to the St. Paul office.

• • • •

It was not our intention to shorten the time usually allowed to the local sections to submit nominations for officers for the coming year. The changes in the bylaws when A.A.C.C. incorporated, plus the early annual meeting date, caught your president off guard so that he in turn gave the Nomination Committee short notice.

Perhaps this was a good thing. Because prompt action was required by the local sections, immediate attention was given to this important function. A better response was obtained from the committee's plea for nominations than has been obtained at many times when more adequate time was given. The excellent slate of candidates is the result of the prompt action of the local section. If you have not returned your properly marked ballots, your prompt attention at this time will help determine the leadership of the Association for the coming years.

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The circulation figure for CEREAL SCIENCE TODAY continues to rise. It has not soared like a well-designed rocket, but it has outperformed our first satellite launching attempt. The action of some of our local sections to provide CEREAL SCIENCE TODAY to their non-national members is appreciated.

The 43rd annual meeting promises to be an excellent one. The scientific program offers the variety needed to meet the wide interests of our membership. The Local Arrangements Committee has provided excellent accommodations, exciting entertainment, and good food—complete in all essential nutrients. A record turnout is predicted. We look forward to the renewal of friendships, the exchange of ideas, and the opportunity for increasing our knowledge in our chosen field which our annual meetings provide.

W. B. BRADLEY

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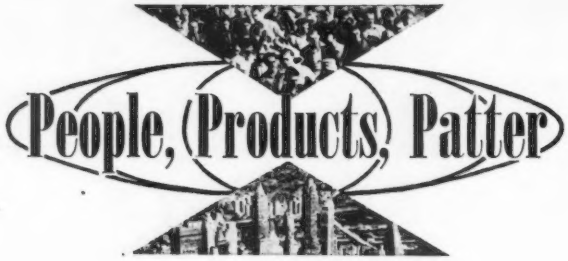

. . . People

Donald G. Brower now vp in charge of research, Victor Chemical Works, from manager of research. He joined Victor in 1932, became director of its special products division in 1950; also is chairman of research planning committee.

Alexander J. Carsky now assistant to vp of food manufacturing, Beech-Nut Lifesavers, Inc., from head of lab at Rochester plant.

Richard P. Choi now in charge of technical activities for American Dry Milk Institute Laboratory, Chicago, from chief chemist; succeeded by **Richard G. Songer.**

Lawrence J. Ferrari joins General Foods Corp., Elizabeth, N.J.

Hugh J. Fetty now vp in charge of production research and products control, American Foods, Inc.

Robert A. Huerman, International Minerals and Chemical Corp., becomes potash sales representative in Quebec, New England, Virginia, Baltimore, and New York City.

Bill Mailhot transferred from General Mills, San Francisco, and placed in charge of the Los Angeles laboratory.

Dan McPherson in charge of General Mills Inc.'s San Francisco Laboratory (from Los Angeles plant), assistant to **Walter Broom. Bill Mailhat** transferred from San Francisco, in charge of the lab in Los Angeles.

Louis Mignacca appointed special representative of Fries & Fries in the firm's New York office.

John H. Nair retires as assistant director of research for Thomas J. Lipton; he will continue as consultant with Lipton, and has opened offices in Summit, N. J., as a consultant to the food industry.

Ralph Potts to Montana State College, Bozeman, from Kansas Milling Co., Wichita.

D. J. Purcell now supervising procurement, production, and sales, Armour & Co., Union Stock Yards, Chicago (from dairy and poultry division).

L. H. Rennie now with Soo Line Mills, Winnipeg, Manitoba.

Kenneth S. Rohrbough, laboratory director of General Mills, Inc., Special Commodities Division, Keokuk, Iowa, died January 5.

John V. Rush joins Sterwin Chemicals, Inc., as technical sales representative, operating from sales offices in Evanston, Ill., under **J. A. Revord,** Chicago district manager; formerly with Mallinckrodt Chemical Works.

Jack W. Salyers appointed a special representative of Sterwin Chemicals. Mr. Salyers has been assigned exclusively to sales and technical service duties in connection with Trithiadol, coccidiostat recently introduced by Sterwin. He will call on nutritionists associated with feed manufacturers.

Basil M. Surgent named agricultural sales representative, potash division, International Minerals and Chemical Corp., Chicago.

Donald K. Tressler resigns as scientific director, Quartermaster Food & Container Institute, Chicago, and returns to consulting practice with laboratories at Westport, Conn. He will also be editor for Avi Publishing Co., Westport, publishers of food technology books.

Alfred S. Wells and **Robert C. Wheeler** promoted to vice-presidencies of Corn Products Refining Co., Argo, Ill. Mr. Wells will be Vice-President for Purchasing, and Mr. Wheeler will have the newly created post of Vice-President for Personnel and Public Relations.

Elliot Ziegenfuss, with General Mills, Inc., at Minneapolis since 1941, transferred to Keokuk, Iowa, as lab director, Special Commodities Division.

. . . Products

Ten new atomic models for constructing organic metal chelate compounds are available from Arthur S. LaPine & Co., 6001 South Knox Ave., Chicago 29. Write for a six-page, five-color bulletin with detailed information.

Other bulletins from the LaPine Co. are on: a new pipe heater with electrical resistance heating wires sealed in waterproof polyvinyl chloride; electrical heating tapes that can be cut with a scissors to required lengths; electrothermal armored heaters that operate at 840°F. and 1470°F.; and equipment for the oil chemistry laboratory, including Tempunits for water baths, portable bath coolers, and dilatometers.

• • •

A "hygroscope" is a new instrument for checking relative humidity from MIAG Northamerica Inc., Minneapolis 4. As the relative humidity of air varies, a foil coated with a humidity-sensitive chemical changes color, ranging from deep dark blue (30%) to bright pink (80%). The instrument, equipped with a thermometer with Fahrenheit and Centigrade scale, is inexpensive, and needs no maintenance or readjustment.

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Literature is available from Brinkmann Instruments Inc., 115 Cutter Mill Road, Great Neck, L.I., N.Y., on piston burettes, ultra microtomes, micro combustion furnaces, oscillographs, ultra thermostats, micro torque balances, precision balances, vacuum drying ovens, contact thermometers, and selecta analytical balances.

. . . Patter

The American Association of Feed Microscopists will hold its sixth annual meeting on June 16, 17, and 18, 1958, in Ottawa, Canada. For complete information write to G. M. Barnhart, Secretary-Treasurer, American Association of Feed Microscopists, c/o Missouri State Department of Agriculture, Jefferson City, Mo.

• • •

Interscience Publishers, Inc., New York, has issued the first supplement to the 15-volume **Encyclopedia of Chemical Technology.** It has 978 pages and its own index; its articles, written and reviewed by experts in the field, range from acrolein to water demineralization.

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A.A.C.C.

LOCAL SECTIONS

New York Section met on December 10 at the Brass Rail. C. W. Ofelt, D.C.A. Food Industries, discussed the effect of various surface-active agents in retarding crumb firmness in bread.

The New York group met January 14 at The Brass Rail, New York City, and heard Dr. Jules Hirsch of the Rockefeller Institute for Medical Research speak on "Dietary fat, serum fat, and arteriosclerosis." Dr. Hirsch related experiments with humans on the effect of various fats and oils on serum cholesterol levels. Fats such as corn oil having high percentages of unsaturated fatty acids greatly reduce serum cholesterol levels, Dr. Hirsch said. The subject of arteriosclerosis is extremely complex and many factors appear to be important, but radical changes in the dietary habits of the general public are not recommended at this time. A lively question-and-answer period concluded the meeting.

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Northern California Section on January 22 heard an illustrated discussion of eggs and egg solids, their functional properties, and their application to the baking industry, given by Leo Kline of General Mills' Western Regional Research Laboratory.

A joint meeting with the Southern California Section is being planned for May 9 and 10 at the Hacienda Motel, Fresno.

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Pacific Northwest Section sends news about recent quality reports on new wheat varieties given December 17 and 18 at a joint meeting of Pacific Northwest Crop Improvement Association and the Western Wheat Quality Laboratory, Pullman, Wash. W. L. Haley, J. W. Montzheimer, Martin Wise, and Joseph DeHaan, Technical Advisory Committee of the Laboratory, reported on the varieties Burt, hard white winter; and Itana, hard red winter already approved for ter; Columbia hard red winter; and Itana, hard red winter already approved for release in Montana and Idaho. In the prelimniary report stage are three other new hard red winter wheats: Westmont CI 12039, Cheyenne CI 8885, and Cheyenne 4 CI 13261.

• • • •

Canadian Prairie Section gave AACC National President W. B. Bradley a "real Canadian welcome" on his official visit, January 21. Speaking at the dinner meeting in the Grain Exchange Building, Winnipeg, that evening, Dr. Bradley presented the thought-provoking message which he is carrying to the various Sections: "Bread – for Man or Rats?" Results from bread enrichment studies are not always applicable to man, Dr. Bradley said, since dietary habits differ, man is not confined to a cage, and human food other than bread is often in far greater proportion than is normally used in animal nutrition studies. Parts of the Widdowson-McCance report (British Medical Council Report Nl. 287) were discussed and some weaknesses in the study were emphasized. Though flour enrichment is sound in principle, the present diet of the U.S. population is sufficiently well balanced that vitamin-enriched bread is not essential for its good health. Dr. Bradley also discussed some aspects of Association affairs.

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Southern California Section met on January 7 to hear Robert H. Anderson of North American Aviation, Inc., speak on a subject that bridges the fields of aviation and cereal chemistry, "Statistical quality control" – the regulation of product characteristics by use of data, facts, records, and information. Its function, Mr. Anderson explained, is the evaluation of quality problems through accumulating and analyzing factual data by means of frequency distribution charts, control charts, sampling, and advanced statistical techniques. Its purpose is to ensure the quality of incoming material and of the product during manufacture, and the high quality of the finished product.

The combined meeting with Northern California Section at Fresno on May 9 and 10 is anticipated with much interest, and all are invited to attend.

• • • •

Niagara Frontier Section's new officers, elected at their January 13 meeting, are Clayton Schneider, chairman; Jack Monier, vice-chairman; Robert Van Burek, secretary; Franklin Wagner, treasurer; and trustees for the terms indicated: Stanley Skelski, 3 years; John Adourian, two years; C. Bronold, one year. Ann Collins retired from the chairmanship.

Speaker at the dinner meeting held at Erie County Technical Institute was Robert C. Wornick of Chas. Pfizer & Co.'s Agricultural Research and Development Department, Terre Haute, Indiana, who reviewed recent advances in feed technolgy.

For the February meeting on the 10th, W. B. Bradley, AACC National President, was scheduled as speaker and guest.

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Midwest Section met on January 6 at the Builders Club, Chicago. Gerald Reed of Red Star Yeast Products Co. spoke on the use of microbial enzyme preparations in the cereal industry. He covered the production of microbial enzymes, their standardization and use in baking, in distilled beverages, and in the production of corn syrup and dextrose. He also reviewed the role of protease and amylase in breadmaking.

New members of the Section are Jack R. Glatthaar, Monsanto Chemical Co.; Solomon Epstein, Sole Chemical Corp., and William E. Ogram, General Mills.

• • • •

Northwest Section met at noon, January 31, in Dayton's Sky Room, Minneapolis. J. A. Anderson, Director, Grain Research Laboratory, Winnipeg, spoke on "Some practical problems and applied research." Dr. Anderson is the newest Osborne Medalist.

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Southern California Section met on December 3 at Rodger Young Auditorium, Los Angeles. Lucien Bavetta of the University of Southern California was the speaker. Dr. Bavetta's talk was "Sense and nonsense about diets." Robert Reynolds, chief chemist, Capital Milling, was elected treasurer.

The January 7 meeting was at Rodger Young Auditorium, and Robert H. Anderson, North American Aircraft, was the speaker. Bill Mailhot, General Mills Sperry Division, is a new member.

INCREASING VEGETABLE PROTEIN CONTENT OF FEEDS THROUGH UNIDENTIFIED GROWTH-FACTOR CONCENTRATES[1]

H. G. LUTHER, J. H. HARE, and G. A. DONOVAN, Chas. Pfizer & Co., Inc., Terre Haute, Indiana

WITHIN THE PAST twenty years there has been a profound change in the nature of the feed ingredients available for formulation of mixed feeds. Formerly, ample percentages of animal by-products were included in rations of swine, chickens, and turkeys. This was done in the belief that substantial quantities of "animal protein," including products of marine origin, were necessary for rapid growth and a satisfactory rate of egg production.

The advance of science has changed the focus on animal protein. Nutritional research, especially of the past decade, has demonstrated that ingredients of this type are of value not only because they contribute certain essential amino acids, but because they supply also certain vitamins, notably vitamin B_{12}, and, more importantly, unidentified growth factors (UGF).

There are several of these factors at present crudely designated by terms such as fish factor and whey factor. It is beyond the scope of this discussion to classify these factors more fully as to source and function. It should be remarked, however, that some products of vegetable origin, such as distillers' solubles and alfalfa, are also considered sources of UGF.

With increasing demands for animal feed brought about by a growing human population, the major sources of unidentified factors have become scarce in relation to the demand for higher output of meat and eggs. As a result, animal-source feed ingredients tend to be included in rations in only minimal amounts, mainly to supply unidentified factors. Vegetable-source components, especially those which are high in protein, therefore constitute an increasing percentage of farm animal rations, as shown in Fig. 1.

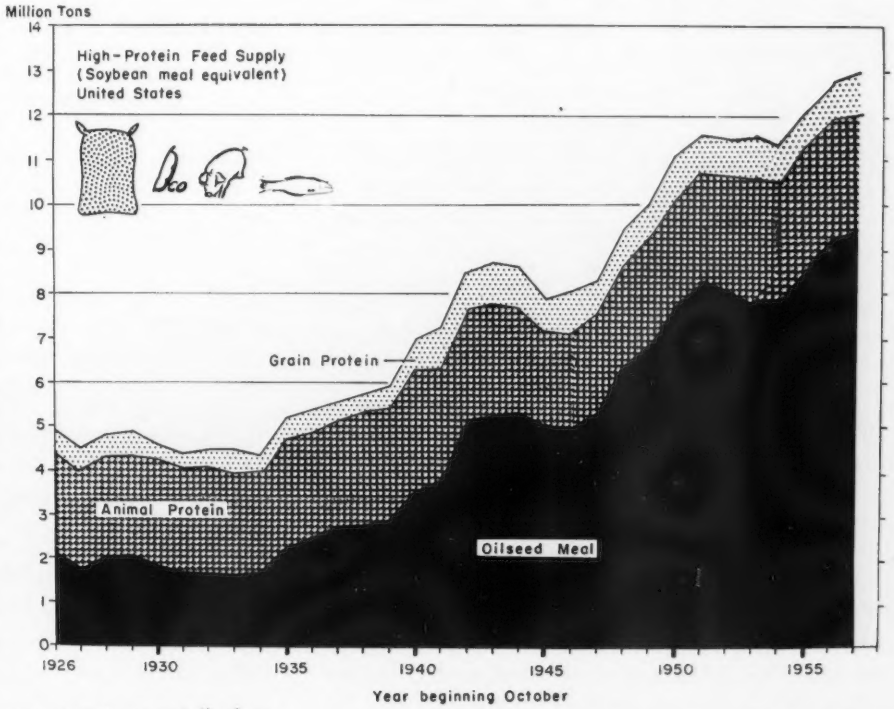

Fig. 1. High protein supply (soybean meal equivalent) United States, Oct. 26, 1926-57. (Courtesy Kansas State College and "Feedstuffs"; compiled by KSC from U. S. Government data).

Chickens

The necessity for including a source of unidentified growth factors in a ration in which soybean meal and corn are quantitatively predominant is seen in Table I.

TABLE I

VALUE OF UNIDENTIFIED FACTORS — BROILERS

PRODUCT	LEVEL IN RATION	EXTRA GROWTH OVER BASAL[a]	REFERENCE
	%	%	
Fish solubles	4	12	Lillie *et al.* (4)
Fish meal	4	11	Lillie *et al.* (4)
Whey products	5	9	Combs *et al.* (1)

[a] Practical chick ration containing only vegetable protein.

Fuller[2] conducted similar tests with a wide range of UGF sources including, besides fish and whey products,

[1] Manuscript received June 1957. Presented at the 42nd annual meeting, San Francisco, May 1957.

[2] Fuller, H. L. Paper preesnted before Southern Agricultural Workers Conference, 1956.

corn distillers' and molasses distillers' solubles and a concentrated fermentation source. All products enhanced growth or feed efficiency, or both.

The importance of supplying adequately the unidentified factors is even further emphasized with the advent of high-energy rations for broilers. The role of UGF in such rations has been extensively explored in trials conducted at the Pfizer Agricultural Research Center. In general, there is marked additional growth response to a source of UGF over a wide range of calorie contents and with various calorie:protein ratios, demonstrating the value of including such a source in high-energy rations. Tables II and III are based on data of unpublished trials in which the basal rations contained 48 to 56% corn and 30 to 36% soybean oil meal. The only animal-source ingredient was fat.

TABLE II
CHICK RESPONSE TO UGF AT CONSTANT CALORIE:PROTEIN RATIO

Calories Per Pound	Protein	Calorie:Protein Ratio	Average Weight at 4 Weeks			Feed Efficiency at 4 Weeks[c]		
			No UGF	3% FM[a]	0.15% FP[b]	No UGF	3% FM	0.15% FP[b]
	%		g	g	g	lb	lb	lb
850	20	42.5	338	358	351	1.81	1.82	1.83
935	22	42.5	369	388	387	1.62	1.57	1.59
1020	24	42.5	369	384	381	1.43	1.46	1.44

[a] Fish meal.
[b] Fermentation product.
[c] Pounds of feed per pound of gain.

TABLE III
CHICK RESPONSE TO UGF AT CONSTANT CALORIE:PROTEIN RATIO

Calories Per Pound	Protein	Calorie:Protein Ratio	4-Week Weight		4-Week Feed Efficiency[b]	
			No UGF	0.30% FP[a]	No UFG	0.30% FP[a]
	%		g	g	lb	lb
850	20	42.5	363	378	1.76	1.76
835	20	42.5	380	420	1.68	1.60
1020	24	42.5	398	411	1.52	1.51

[a] Fermentation product.
[b] Pounds of feed per pound of gain.

It will be noted that there was a growth response to UGF at each calorie level, although the optimum appeared to be at 835 calories.

Turkeys

For turkeys, also, a liberal supply of unidentified factors is essential for optimum growth and feed efficiency when the rations basically are of the corn-vegetable protein type. This is illustrated in results of two experiments reported by Combs and Shaffner (2). The basal ration of experiment 1 was corn and soybean meal with adequate supplements of all known factors. In experiment 2, 10% corn gluten meal replaced an equivalent amount of corn. Results of the two trials appear in Table IV.

TABLE IV
EFFECT OF VARIOUS SOURCES OF UGF ON GROWTH OF POULTS TO 5 WEEKS
(Courtesy G F. Combs and *Poultry Science*)

Group No.	Supplement	Number of Survivors[a]	5-Week Weight
			g
	Experiment 1		
1	None	17	384
2	Vitamin B_{12} Product A	18	413
3	Vitamin B_{12} Product B	17	397
4	As 3, + 5% dried whey and 5% dried brewers' yeast	18	438**
5	As 4, + 5% crab meal	18	501**
6	As 5, + 5% fish meal	17	551**
	Experiment 2		
1	Vitamin B_{12} Product B	17	507
2	As 1, + 5% dried brewers' yeast	16	552
3	As 1, + 10% dried brewers' yeast	16	605*

[a] Starting numbers 18 per group in experiment 1 and 17 per group in Experiment 2.
* Significantly different (5% level) from group 1.
** Significantly different (1% level) from group 3.

The need for adequate UGF extends over the entire growing period of turkeys. This has been shown in trials conducted at the Pfizer Agricultural Research Center. The basal rations contained 93 to 94% vegetable-source ingredients, the remainder being minerals and vitamin and antibiotic supplements.

The two UGF sources used in this study were a mixture of fish meal and whey and a concentrated fermentation product. Both sources substantially enhanced rate of growth and improved feed efficiency, not only for the early period but up into the stage when market weight was approached, as shown in Table V.

TABLE V
RESULTS OF FEEDING TRIAL WITH TURKEYS

Supplement to Basal	Average Weight	Feed Per Pound of Gain
	lb	lb
	8 Weeks	
None	3.97	2.26
0.45% Fermentation product	4.23	2.20
10% Fish meal + 3% whey	4.24	2.13
	18 Weeks	
None	13.8	3.61
0.45% Fermentation product	14.2	3.51
10% Fish meal + 3% whey	14.3	3.48

Swine

With swine, much interest focuses on early weaning. In the formulation of rations for the critical few weeks after removal from the sow, unidentified growth factors require careful consideration.

An illustrative study of the effect of UGF supplementation of rations of early-weaned pigs is that reported by Hanson (3). Each lot comprised eight Durocs and four Poland-Chinas weaned at 3 weeks and placed on complete starter diets containing adequate quantities of all known required nutrients for a 5-week period. UGF supplements comprised dried whey, condensed fish solubles, a fermentation product, and various combinations of these. Results appear in Table VI.

TABLE VI
COMPARISON OF SOURCES OF UGF FOR WEANLING PIGS

SOURCE OF UGF	AVERAGE DAILY GAIN	IMPROVEMENT	FEED PER POUND OF GAIN	IMPROVEMENT
	lb	%	*lb*	%
None	0.57	..	2.25	..
3% Dried whey (W)	0.67	18	2.31	—3
2.5% Condensed fish solubles (FS)	0.65	14	2.25	..
0.5% Fermentation product (FP)	0.71	24	2.17	4
W + FS	0.68	19	2.20	2
W + FP	0.81	42	2.10	7
FS + FP	0.75	31	2.24	..
W + FS + FP	0.69	21	2.25	..

There was substantial extra growth with all of these UGF supplements, the fermentation product and the combinations containing it showing the largest increases.

The foregoing illustrations emphasize the importance of adequate supplies of unidentified growth factor in the nutrition of chickens, turkeys, and swine. For ruminants the role of these factors is less well elucidated. Feeding trials are difficult to control, because in the adult ruminant UGF is provided by fermentation processes within the rumen.

Economics of UGF Supplementation

Within recent years, it has been found possible by fermentation to develop a highly concentrated source of UGF. In many feeding trials this concentrated fermentation source has been found to be as effective at less than 1% of the ration as several per cent of the conventional nonfermentation sources. This fermentation product was mentioned in the feeding trials presented in the preceding tables.

The availability of a more concentrated source of unidentified factors has further affected the pattern of rations for swine and poultry, to the end that a higher percentage of vegetable-source protein can be included, with the omission of most or all of the animal-source ingredients as UGF sources. Many feed manufacturers have modified their formulas along these lines. A rebalancing is necessary, chiefly to maintain the levels of protein, energy, minerals, and vitamin B_{12}. This can be effected through modifying percentages of existing ingredients and by the addition of certain other less expensive ingredients, so that the over-all cost of the ration is reduced. However, the extent of this saving depends upon prices of the major varying components — corn, soybean oil meal, and alternate UGF sources.

Modifications such as the above to include a fermentation source of UGF have been carried out with numerous commercial broiler formulas. Depending upon their original composition, the cost reductions have ranged from a few cents to approximately $8.00 per ton.

These advantages would exist even if, with the inclusion of the fermentation source of UGF, growth rate and feed efficiency were no better than would be obtained on the original rations. However, in many instances, the fermentation source, either alone or in combination with small amounts of other UGF sources, has in practice brought about greater growth and feed efficiency, which add to savings originating from lower ration costs.

The economics of UGF supplementation of turkey rations are illustrated in an unpublished study conducted by Pfizer investigators, using as a basal ration a commercial "open formula" turkey starter (Ration 121). This contained fish meal, dried whey, and meat scraps. Two modifications were made to supply UGF by means of a fermentation source. In Ration 119 the fish meal, dried whey, and part of the meat scraps were omitted, and in Ration 120 part of the fish meal was omitted and all other components remained. Meat scraps are not considered a very effective UGF source. Leaving in 3% of meat scraps in 119 contributes to the calcium and phosphorus content.

The original ration and the two modifications were tested concurrently with three groups of turkeys. As Table VII shows, growth was slightly better with the two modifications than with the original, and feed efficiency was about the same. Costs of the modifications containing a fermentation source were somewhat lower.

TABLE VII
ECONOMIES EFFECTED BY REPLACING OTHER UGF SOURCES WITH A CONCENTRATED FERMENTATION SOURCE IN A COMMERCIAL RATION FOR GROWING POULTS

	RATION 121	RATION 119	RATION 120
	Original[a]	Complete Replacement	Partial Replacement with Fermentation Source
Varied UGF sources (%)			
Fish meal	5.00	...	2.00
Dried whey	3.00	...	...
Fermentation source	...	0.15	0.15
Meat scraps	5.00	3.00	...
Cost reduction, per ton	...	$4.00	$2.45
Growth			
Average weight, 8 weeks (g.)	1638	1704	1684
Growth index	100	104	103
Feed efficiency			
Pounds feed/pound of gain	1.88	1.90	1.87
Feed efficiency index	100	101	99

[a] This is an "open formula" commercial feed.

For swine rations, economic evaluations likewise have favored use of a more concentrated source of unidentified growth factors.

In a trial conducted by Pfizer investigators, costs of raising pigs were determined for four protein supplements. These were all of the corn-soy type with 4% meat and bone scrap and fortified with known vitamins and minerals. One contained 10% fish meal and the other three graded percentages of a concentrated fermentation source of unidentified growth factors. Data are presented in Table VIII.

TABLE VIII
ECONOMIC EVALUATION OF UGF SOURCES FOR GROWING-FATTENING SWINE

TYPE OF DIET	COST OF FEED PER POUND	FEED PER POUND OF GAIN	FEED COST PER POUND OF GAIN	AVERAGE DAILY GAIN
	cents	*lb*	*cents*	*lb*
Vegetable basal	3.77	3.35	12.63	1.60
10% Fish meal	4.09	3.36	13.74	1.57
Vegetable + 0.35% fermentation product	3.87	3.33	12.89	1.65
Vegetable + 0.70% fermentation product	3.97	3.18	12.62	1.73
Vegetable + 1.40% fermentation product	4.17	3.25	13.55	1.69

The feed cost per pound of gain was similar for the basal ration and for that containing 0.70% of the fermentation source. Since the growth rate on the supplemented

ration was approximately 8% greater, over-all cost of feeding to a given weight should be about 6% less. When compared with the ration containing fish meal, the one containing 0.70% of fermentation source would show even greater economic advantages because of lower cost of ration and better gains and feed efficiency. There seemed to be no additional advantage from a higher level of fermentation product.

For early-weaned pigs the following experiment illustrates the economics of the use of a concentrated fermentation source of unidentified growth factors in both prestarters and starters. There were three rations: a basal all-vegetable, the basal plus a fermentation source of UGF, and a ration containing fish meal. Results of the feeding trial are shown in Table IX.

TABLE IX

COMPARISON OF SOURCES OF UNIDENTIFIED GROWTH FACTORS FOR BABY PIGS WEANED AT ONE WEEK

TYPE OF DIET	AVERAGE DAILY GAIN	AVERAGE DAILY FEED CON.		AVERAGE DAILY FEED COST	COST PER POUND OF GAIN
	lb.	*lb.*		*cents*	*cents*
Vegetable basal	0.77	Prestarter	0.45	5.88	
		Starter	1.45	5.39	14.63
		Total		11.27	
Vegetable basal plus 0.15% fermentation source of UGF	0.95	Prestarter	0.61	7.99	
		Starter	1.47	5.54	14.24
		Total		13.53	
Fish meal	0.79	Prestarter	0.47	6.24	
		Starter	1.42	5.51	14.87
		Total		11.75	

It will be seen that greatest gains were made with the concentrated source, and costs per pound of gain were least with this ration.

The relation of unidentified factors to specific phases of metabolism is only beginning to be explored. A report by Soule and Hare[3] suggests a close relation of the factor or factors in a fermentation source of UGF to protein metabolism as well as to fat deposition. Swine on a ration containing 14% protein up to 125 lb. and 12% thereafter gained as rapidly when fed the fermentation UGF source as another group, not so supplemented but receiving 18% protein up to 125 lb. and 16% from 125 to 200 lb. On the lower protein levels, the rate of gain of the unsupplemented group was 12% below that of the supplemented one.

Another important finding in these same studies is that in supplemented swine, the average back-fat thickness was less than that of unsupplemented swine or of swine receiving fish meal. Other trials have shown higher carcass quality and lower dressing percent in swine receiving the fermentation source UGF.

[3] Soule, R. P., Jr., and Hare, J. H. Paper presented before Southern Agricultural Workers Conference, February 1957.

Future Trends

Although the unidentified factors under discussion are commonly called "growth factors" because their presence was established through their effects on growth, this may be only one of their roles. As indications, there are the reports cited by Slinger (5) that alfalfa contains a factor essential to egg production and hatchability in chickens and to reproduction in sows. The Texas group has reported a factor influencing hatchability of chicken and turkey eggs in liver, fish solubles, fish meal, and certain types of fermentation products. Pfizer studies[4] indicate a relationship of a fermentation source to eggshell strength. Other unpublished data have shown increased egg production.

Summary

The newer knowledge of unidentified growth factors has enabled formulation of rations for chickens, turkeys, and swine in which vegetable protein sources can be included at greater percentages, thus utilizing an abundant source of animal provender. Rations formulated according to this new knowledge are fully adequate for optimum productive performance and often are of lower cost.

Literature Cited

1. COMBS, G. F., ARSCOTT, G. H., and JONES, H. L. *Poultry Sci. 33:* 71 (1954).
2. COMBS, G. F., and SHAFFNER, C. S. *Poultry Sci. 29:* 623 (1950).
3. HANSON, L. E. Annual swine feeders day. Univ. of Minn., Inst. of Agr., pp. 23-27 (multilith.) (Sept. 23, 1955).
4. LILLIE, R. J., SIZEMORE, J. R., and BIRD, H. R. *Poultry Sci. 32:* 855 (1953).
5. SLINGER, S. J. *Feedstuffs*, p. 6a (Jan. 21, 1956).

[4] Donovan, G. A., and Patterson, E. B. Paper submitted for presentation before Southern Agricultural Workers Conference, February 1958.

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